

Researchers Discover New Way to Store Information Via DNA

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Researchers at UC Riverside have found a way to get into your body and your bloodstream. No, they're not spiritual gurus or B-movie mad scientists. Nathaniel G. Portney, Yonghui Wu, Stefano Lonardi, and Mihri Ozkan from UCR's departments of Bioengineering, Computer Science and Engineering, Biochemistry, and Electrical Engineering, and the Center for Nanoscale Science and Engineering, are just talented when it comes to manipulating DNA.

In their paper, "Length-based Encoding of Binary Data in DNA," which was published by the American Chemical Society last month, the researchers discovered a system to encode digital information within DNA. This method relies on the length of the fragments obtained by the partial restriction digest rather than the actual content of the nucleotide sequence. As a result, the technology eliminates the need to use expensive sequencing machinery.

Why is this discovery important? The human genome consists of the equivalent of approximately 750 megabytes of data – a significant amount of storage space. However, only about three percent of DNA goes into composing the more than 22,000 genes that make us what we are. The remaining 97 percent leaves plenty of room to encode information in a genome, allowing the information to be preserved and replicated in perpetuity.

Given the size of the DNA fragments (one base pair of DNA is 0.33 nanometers), one could store a large amount of information in a very

small space. By storing messages within DNA, organizations can “tag” objects to verify authenticity, as well as to inconspicuously send data to a specific destination.

“Already there are several companies using DNA to tag objects that they certify to be original and which then can be very difficult to counterfeit,” says Stefano Lonardi, Associate Professor of Computer Science & Engineering at UCR’s Bourns College of Engineering.

For example, the British company, Redweb Security, has developed something called i-powder that tags DNA and another company called PSA DNA Authentication services tags sports memorabilia.

“What we developed at UCR is a method to encode a message in DNA in a way that does not require an expensive sequencing machine,” notes Lonardi. “The decoding still requires a wet lab procedure, but the experimental procedure is significantly easier.”

Source: University of California, Riverside

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